



### D1.3.1 B HANDS - plan for use and dissemination

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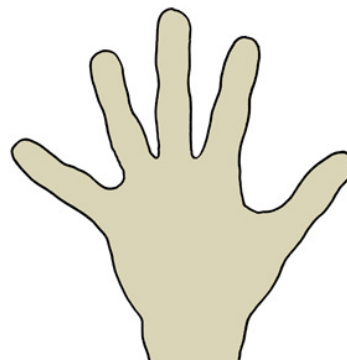
# PROJECT FINAL REPORT

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HANDS

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Helping Autism-diagnosed teenagers  
Navigate and Develop Socially

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## **References**

## Section A. Dissemination

This section includes a list of all scientific publication within the HANDS project as well as all dissemination activities. More details can be found in the deliverable D8.3, “A List of papers and conference presentations”, which also includes abstracts of the HANDS papers.

### List of scientific (peer reviewed) publications.

No	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher & Place of publication	Year of publication	Pages	Permanent identifier	Is/will open access provided?
1	The Role of Credibility in the Design of Mobile Solutions to Enhance the Social Skill-Set of Teenagers Diagnosed with Autism.	Anne Gerdes	Journal of Information, Communication & Ethics in Society	4	Emerald, United Kingdom	2011	1477-996X	ISSN: 1477-996X	No
2	Helping Autism-Diagnosed Teenagers Navigate and Develop Socially Using E-Learning Based on Mobile Persuasion	Peter Øhrstrøm	International Review of Research in Open and Distance Learning	Vol.12.4	Canadian Institute of Distance Education Research Canada	May 2011	p. 54-71	1492-3831	No
3	A tekintet-követéses módszertan alkalmazása a neurokognitív fejlődési zavarok diagnosztikájában: alapok és perspektívák. [Applying gaze-tracking technique in the diagnosis of neurocognitive developmental disorders. Foundations and perspectives.]	Miklos Gyori	K. Radványi, ed., <i>A diagnosztika aktuális kérdései. [Current issues in diagnostics.]</i>	(in press) Budapest:	Eötvös Kiadó, Hungary				No
4	Key Factors Mediating the Use of a Mobile Technology Tool Designed to Develop Social and Self Management Skills in Children with Autistic Spectrum Disorders	Joseph Mintz		. 0360-1315 ,		Accepted Manuscript			
5	Branching Time as a Conceptual Structure	Peter Øhrstrøm	Conceptual structures: from information to intelligence	Volume 6208/2010	ICCS 2010, Springer Press, BRD	2010	125-138	10.1007/978-3-642-14197-3_14	No

6	The application of persuasive technology to educational settings	Mintz, Joseph	Educational Technology Research & Development	accepted	Springer, Learning & Instructions, BRD		na	na	No
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## List of other dissemination activities

LIST OF DISSEMINATION ACTIVITIES								
N O.	Type of activities <sup>15</sup>	Main leader	Title	Date	Place	Type of audience <sup>16</sup>	Size of Audience	Countries addressed
1	TV Clip	Morten Aagaard	Presentation of the HANDS project including visit to Egebakken	27-11-2008	DR.dk	Medias	< 5 mill	DK
2	Conference paper	Aagaard, Morten	It might be Kairos	2-4 of June, 2008	N. A.	Conference	<400	All
3	Conference paper	Albrechtslund, Anders	Surveillance in Mixed Spaces : Persuasion and resistance	, 15. oktober 2008 - 18. oktober 2008	N. A.	Conference	<400	All
4	Conference	Gyori, M	Mobile Digital Technology As A Helping Hand - The 'Hands' Project	9th May, 2009.	N. A.	Conference	<300	HU
5	Conference paper	Balázs, A	Psychiatry Meets Mobile Digital Technology For High Functioning Autism: The HANDS Project	22-26 August, 2009	N. A.	Conference	<400	European countries
6	Presentation	Devecchi, M.C	The HANDS project: a mobile phone solution for children on the autistic spectrum. The Evaluation and Implementation Guide	March 2009	NA	Conference	<50	UK
7	Conference paper	Devecchi, M.C.	The HANDS project: evaluating the use of smartphone applied technology for children with autism, or the case of overcoming contrasting capabilities and irreducible difference.	29 May 2009	Conference	Conference	<100	HU
8	Conference paper	Devecchi, M.C	Supporting user participation in developing mobile technology to help young people with autism: The HANDS smartphone project	9-11 July 2009	Conference	Conference	<300	EU
9	Conference paper	Mintz, J.	A mobile phone solution for young people with autism: Introducing the HANDS project	2-6 September, 2009	Conference	Conference	<300	UK
10	Conference paper	Pertou, Maria Elisabeth	Adaptive Persuasive Scripts	2009	Conference	Conference	<300	All
11	Conference paper	Ranfelt, Anja M	Towards a Handy Interactive Persuasive Diary for Teenagers with a Diagnosis of Autism	26-29 April 2009	NA	Conference	<300	EU
12	Conference paper	Henrik Scharfe	A Conceptual Analysis of Difficult Situations - developing systems for teenagers with ASD	2009	NA	Conference	<300	All
13	Conference presentation	Kanizsai-Nagy	HANDS from a strictly autism-specific point of view	April 23, 2010. Budapest	Conference	Conference	<100	HU

14	Conference	Søren Madsen	Presentasjon av prototype "Hands"	25 June 2010		Scientific Community	<200	NO
15	Conference	Michael Sørensen	Teorien bak og første evalueringer av utprøvingerne i "HANDS" prosjektet [Theories behind and first evaluations of the tests in "HANDS"]	25 June 2010		Scientific Community	<200	NO
16	TV Clip	Henrik Schärfe	Lecture on persuasive design and HANDS on Danish national broadcast	25 March 2010	DR.dk	Medias	< 5 mill	DK
17	Conference article	Bertel, Lykke Brogaard	The Use of Rewards in Persuasive Design	2010	Proceedings of Poster Papers, p25-28	Research paper		All
18		Anne Gerdes	Issues of credibility in developing mobile solutions for autism-diagnosed teenagers	2010	Proceedings of Poster Papers, p37-40	Research paper		All
19	Workshop presentation	Gyori, Miklos	Introduction to HANDS-in-action: goals, plans and a brief midway summary.	April 23, 2010. Budapest	N.A.	Conference	<300	HU
20	Conference paper	Gyori, M	In the garden of Hungarian minds': an exploratory eye-tracking study on sentence integration in Hungarian readers	25-26 October 2010	NA	Conference	<300	HU
21	Conference paper	Gyori, M	Mobil digitális gyógypedagógia: fókuszbán az autizmus. A HANDS projekt és első eredményei. [Mobile digital special education: autism in focus. The HANDS Project and its first results.]	22-23 January 2010	NA	Conference	<300	HU
22	Conference paper	Gyori, M	Testing a mobile digital cognitive support system for high functioning adolescents with ASD: Prototype I of the HANDS system	8-10 October, 2010	NA	Conference	<1000	EU
23	Conference paper	Mintz, J	How Easy is it to Introduce Something New? Issues Associated with Introducing a New Technology Tool (the HANDS Mobile Solution) to Develop Social Skills with Children with Autism	2010	NA	Conference	<1000	EU
24		Mintz, J.	The Application of Persuasive Technology to educational settings: Some theoretical from the HANDS Project	June 4-6 <sup>th</sup> , 2010	NA	Conference	<300	EU
25	Conference paper	Scharfe, H	Tracing Concepts in Designing for Change		NA	Conference	<300	EU
26	Conference paper	Stefanik, K	A HANDS kognitív támogató rendszer autizmussal élők számára I.: tesztelés Kísérleti Feladatelemzéssel. [The HANDS cognitive support system for people living with autism I: testing by Experimental Task Analysis.]	27-29 May 2010	NA	Conference	<300	HU
27	Conference paper	Várnagy, Z	A HANDS kognitív támogató rendszer autizmussal élők számára II.: tesztelés szemmozgáskövetéses (eye-tracking) módszerekkel. [The HANDS cognitive support system for people living with autism	Hungary, 27-29 May 2010	NA	Conference	<300	HU

			II: testing by eye-tracking.]					
28	Conference talk	Miklos Gyori	Innovatív technikai lehetőségek a neurokognitív fejlődési zavarok diagnosztikájában: a tekintet-követés (eye-tracking) technika. [Innovative technological perspectives in the diagnosis of neurocognitive developmental disorders: the eye-tracking technique.]	25 September 2010. Budapest	NA	Conference	<300	HU
29		Peter Øhrstrøm	Helping Autism-diagnosed Teenagers Navigate and Develop Socially Using E-learning	27-29 January 2010	NA	Conference	<200	EU
30	Conference talk	Várnagy, Zsombor	A HANDS kognitív támogató rendszer autizmussal élők számára.: tesztelés interaktív tekintetkövetéses módszerekkel.	25-27 May 2011, Budapest	NA	Conference	<200	HU
31	Conference talk	Gyori, Miklos;	A mondatintegráció és a mondatintegráció/tudatelmélet kölcsönhatás vizsgálata magyar nyelven, tekintetkövetéses technikával: előzetes eredmények [Investigating sentence integration and sentence integration / naive theory of mind interactions in the Hungarian language, by gaze-tracking technique. Preliminary findings.]	25-27 May 2011, Budapest	NA	Conference	<200	HU
32	Conference talk	Gyóri, Miklós	Miért nélkülözhetetlen a komplex empirikus kutatómódszertan? Integrált eredmények és érvek a HANDS projektből [Why complex empirical research methodology is indispensable].	November, 2011, Budapest	NA	Conference	<200	HU
33	Conference talk	Stefanik, Krisztina	Egyéni támogatási szükségletek és kvantitatív hatásmérés: a Kísérleti Feladatanalízis módszertana és eredményei [Individual support needs and quantitative testing of effectiveness: the Experimental Task Analysis and its results].	, 3-5 November, 2011, Budapest	NA	Conference	<200	HU
34	Conference talk.	Várnagy, Zsombor	Speciális nevelési igények, innovatív kutatási eszközök: a tekintetkövetéses módszertan alkalmazása a HANDS projektben. [Special educational needs, innovative research techniques: using gaze-tracking technique in the HANDS Project.]	3-5 November, 2011, Budapest	NA	Conference	<200	HU
35	Conference talk	Kanizsai-Nagy	Autizmus, speciális nevelési igények, infokommunikációs támogatás: a HANDS projekt kontextusa és módszertanai. [Autism, special educational needs, info-communication assistance: the context and methodologies of the HANDS Project.]	3-5 November, 2011, Budapest	NA	Conference	<200	HU
36	Conference talk	Gyori, Miklos	Innovatív IKT, speciális (oktatási) szükségletek: biztos távlatok, váratlan csapdák. A 'HANDS' mobil kognitív támogató rendszer első tesztjének tanulságai. [Innovative ICT, special (educational) needs: firm perspectives, unexpected traps. Lessons from first testing of the 'HANDS' mobile cognitive support system.]	14-15 January 2011. Budapest	NA	Conference	<200	HU



37	Conference poster	Gyori, Miklos	Sentence integration / social cognition interaction in the Hungarian language: preliminary findings.	21-25 August, 2011.	N. A.	Conference	<300	European countries
38	Conference Poster	Gyori, Miklos	Testing a mobile cognitive support system for teenagers with autism by a dynamic-interactive eye-tracking methodology.	21-25 August, 2011.	N. A.	Conference	<300	European countries

## Section B. Plans for Exploitation

In the following section of the HANDS exploitation perspectives, we shall first of all describe the ‘market’ of assistive ICT tools for people with ASD, and then we shall – on this background - discuss the refinement of the exploitation potential (including specific plans for exploitation) of the HANDS Toolbox.

### B.1. HANDS in the ‘market’ of assistive ICT tools for people with ASD

In order to assess the value of the HANDS system as well as to outline its future development possibilities, it seems vital to locate HANDS in the market of existing assistive ICT solutions for individuals with ASD. Below we give a short review of the most important existing solutions and attempt to identify the position of HANDS among them.

#### B 1.1 Existing assistive ICT tools for ASD

In a previous deliverable on initial cognitive psychology requirements on software design and content (D2.2.1; Gyori et al, 2008) we briefly reviewed the computer-based interventions, which were available at the time, and were of relevance to developing HANDS. The aims of that research were defining the space and role of the future HANDS software and pinpoint its possible unique features. In the deliverable we built up a taxonomy for categorizing existing software systems that have been offered for people (usually children) with autism. Figure 1 below illustrates this classification.

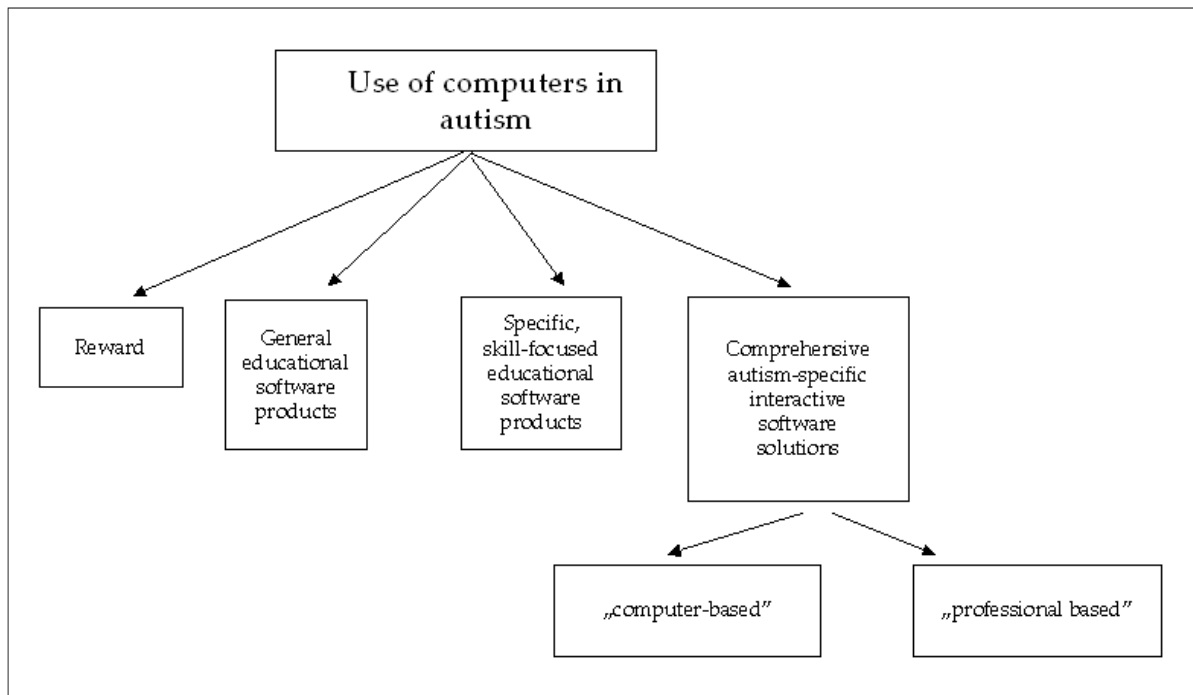


Figure 1. A taxonomy for ICT tools in ASD intervention (from Gyori et al, 2008)

It seems that this taxonomy is still able to cover the programmes, which have come to the market since our last review. For this reason we briefly summarize below the relevant solutions, following the taxonomy above and with a special focus on its effectiveness.

### B. 1.2 Specific, skill-focused solutions

These programmes aim at developing *specific skills* with a closed content (i.e. it cannot be modified by the user). Usually they contain tasks on different levels, but above this the possibility of individualization is limited. The user usually is a responder, except for virtual environments where the client can function as a (quasi) agent.

Our examples included a software system developed with the purpose of emotion recognition (Golan and Baron-Cohen 2006); another example can support everyday problem solving (Bernard-Opitz et al. 2001); one is a computer-based intervention to support communication skills (Hetzroni & Tannous 2004); and yet another example is a virtual environment intervention (Mitchell et al, 2007). Most of these studies reported some achievement on the targeted field, but poor out-of-setting generalization effect emerged.

Since our previous review, new software systems of this kind and efficiency studies about them, have been published. Hopkins et al (2011) used a computerized social skill training programme, both with high and low functioning persons with autism,

called **FaceSay**. The software provides a structured environment with interactive, realistic avatar assistants to practice attending to eye gaze, discriminating facial expressions and recognizing faces and emotions. They demonstrated improvements in both groups, and found encouraging the transfer to natural environment.

Beaumont and Sofronoff (2008) tested a computer game called the **Junior Detective** which was an important part of a complex training programme. This included in vivo groups and parent and teacher training to develop social understanding, especially emotion recognition and social problem solving of adolescents with Asperger syndrome. In the computer game, the user plays the role of a detective who specialized in decoding other's mental states. Parents and teachers reported improvements, which were maintained at 5-months follow-up. However, there was no difference in the improvements made by children in the intervention and control conditions on facial expression and body-posture recognition measures.

In sum, as Wainer and Ingersoll (2010) state in their review: though the use of this kind of innovative computer technology in developing specific social-communication skills of people with autism seems to be effective, the empirical support is quite limited.

### **B. 1.3 Comprehensive interactive software solutions: computer-based**

These complex computer-based software systems have been developed to support children with autism in various complex ways. Their content is variable according to the age and level of users.

Earlier we gave a review (Gyori et al, 2008) of one of these software packages, the **TeachTown™** software (Whalen et al, 2006). The software supports the development of receptive language, social understanding, self-help skills, attention, memory, auditory processing and early academic skills.

A follow-up study by Whalen et al, 2010, has been published about the efficiency of the software since our review, with some interesting conclusions which are congruent with our findings in the HANDS project:

- The amount of time children spent on using the software was positively correlated with the progress in school lessons as well as the level of performance.
- One third of the children did not show improvement.

Thus the authors conclude that computer-assisted instruction may not be appropriate for all children with ASD, and they find it important to determine the

characteristics of the children, who are likely to benefit from this form of intervention.

#### **B 1.4 Comprehensive interactive software solutions: professional-based**

The main characteristic of these software products is that the software offers a very flexible and complex frame, which can be individually customized according to the needs of the users. Content is open and changing, and *is developed by a professional*, according to evidence-based intervention principles. Usually the *system is able to collect and process data about the frequency and quality of usage*. The example we reviewed earlier (Gyori et al, 2008) is the **SymTrend**® system (Calvanio, Mesibov & O'Callaghan, 2006; [www.symtrend.com](http://www.symtrend.com)).

As highlighted in the review, SymTrend has two different forms: one to support *individuals with autism* (i.e., for younger or lower-functioning individuals) and another one for *users with Asperger syndrome* (i.e., for older or more able/high-functioning users).

The previous one is used *by the parents* in order to record the behaviour of their child in a ready-to-use structure. The processed data give a useful basis for professionals to plan interventions for the child. The system is also able to give advice on how a disruptive behaviour should be handled.

*The Asperger syndrome section's* main function is to support the user in different settings by reminders, schedules, social rules, etc. These interventions are developed and uploaded by *teachers* according to the difficulties and skills of the given user.

Recently SymTrend developed new applications: one to support the management of social pragmatics in class rooms, emotional self-regulation, and stressor-monitoring; and another for self-management of executive functioning and life skills: chore, activities, time management, mood/energy, and money management.

The most relevant aspect of SymTrend applications is – in terms of the capabilities of the HANDS toolset - that they can be uploaded to mobile devices (iPhone or smartphone), therefore the support is available directly in the situation.

#### **1.5 Mobile software systems**

As we emphasised above, one of the most important aspects of the SymTrend's Asperger application is its mobility.

In this section, we outline some other software systems, which also can be used 'in-situ', as an on-line and mobile support. We decided to broaden our original taxonomy to include these pieces of software, as we believe that this can be a crucial characteristic of any efficient intervention for people with ASD.

**The Azahar Project** was developed by Javier Sevilla's team, financially supported by the Orange Foundation, Spain ([www.proyectoazahar.org](http://www.proyectoazahar.org) ).

The Azahar is a *mobile platform* with free applications for mobile phones and personal computers to assist children within communication, entertainment and self-organisation, and to increase their independence. Individualized pictograms, images and sounds can be uploaded, so users can chose the photos, sounds and voices of people they know for the communication.

Additional five applications have been made available since October 2009 (from [www.proyectoazahar.org](http://www.proyectoazahar.org)):

- The HELLO communicator lets users communicate through pictograms.
- The MESSAGES application makes it easier to send text messages, thanks to pictograms.
- The MUSIC mp3 player makes it easier to access music.
- The PERSONAL GUIDE application is similar to a business card, with pictograms enabling an autistic person to introduce him/herself in a visual language.
- The TIC-TAC application helps in situations where the user has to wait; by visually portraying the time elapsed.

Though the Azahar applications seem to be easy-to-use, well structured, simple, autism friendly and above all can be used by people of the lower end of the autism spectrum disorder scale, unfortunately we could not find any efficiency study on this project in the scientific literature.

**Micro Rolltalk** is a mobile solution aimed at speak-disabled individuals. The programme consists of images, photos that you can press in order to make an action take place. The Micro Rolltalk actions are of a large variety

- Reading a message aloud
- Sending a sms
- Seeing the calendar

Furthermore the Micro Rolltalk includes a calendar and enables the use of prompts for appointments.

The mobile application is supposed to go together with a web authoring tool.

No evidence indicates, though, that the value of the use of the Micro Rolltalk has been documented in any systematic manner.

Currently it is offered only for the Windows Mobile 6.5 platform.

**Handifon** is a mobile solution developed by handitek in Sweden<sup>1</sup> aimed at active individuals with reduced memory function. This means that short term and long term memory does not work properly for the users in question.

The program includes a long list of sub-apps, from which the single individual can chose and add the relevant ones to his mobile phone. Examples of the apps are:

- Calendar (including confirmation of implemented activities)
- Notes
- Instructions for caretakers in case of emergency.
- Dictaphone
- Simplified calculator orientated towards shopping
- Image projector
- Music player including the possibility to listen to a maximum of 5 tunes
- Simple contact and address book

Handifon does not include a PC authoring tool, but it includes a programme for transferring images, sounds and notes from a PC.

There is no evidence indicating that the value of the use of the Handifon has been documented in any systematic manner.

Currently it is offered on the outdated Windows Mobile 6.5 platform.

**Comai** is a Swedish developed mobile solution<sup>2</sup> focusing on time management.

The Comai focus on time management, can be carried out either by the user on the mobile phone or by an administrator on a web client or a mobile phone.

The strong focus on time managements enables that the Comai system offers a small, but well chosen, set of functionalities relating to time management:

- Adding appointments and describing the appointment with notes and texts
- Management of recipients of appointments
- Adding pictures to calendar appointments
- Adding different kind of reminders for appointments – with images

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<sup>1</sup> <http://www.handitek.se/handifon>

<sup>2</sup> <http://www.comai.se/>

There is no documentation indicating that the value of the use of the Handifon has been proven scientifically.

The solution is running on Android 2.1 and above.

#### **1.6 B. Studies on assistive mobile ICT, without ‘massive’ software development**

Mechling et al. in two executive studies (2009; 2011) introduced a **Personal Digital Assistant** (PDA) in order to increase independent task completion and task transitions for students with ASD. A portable self-prompting device with visual, auditory, and video prompts was used to support students in reading and using cooking recipes. The system proved to be effective as it increased independent performance across the multiple step tasks as well as over time. In the second study they replicated these results with three students and found that all of them were able to complete a greater number of in between-task transitions using the PDA.

Mechling et al. also used an interesting – and HANDS-related – methodology to test the effectiveness: they compared task completion with the PDA-based intervention to a picture-based task-strip aided condition. They found that task completion was higher for two of the students compared to baseline conditions using a picture-based task strip, but students performed within task transitions equally as well using the PDA and the task strip.

The study of Cihak et al. (2010) is interesting for us, because they used a **mobile IT tool in a classroom setting**. They used video modelling running on a video iPod to help young students with autism in independent transitioning between locations and activities within the school. The data indicate that all participants began transitioning more independently after the intervention was introduced and that their performance decreased with the withdrawal of intervention. They also emphasise the role of portability in settings where traditional means of delivering video models (e.g., televisions and computers) may not be accessible.

In summary we can conclude that in the last three years new ICT tools appeared in the market and efforts have been made to test their efficiency. In the reviewed literature some interesting aspects, experiences and results emerged that are convergent with our findings in HANDS project (see later in this document).

#### **B 1.7 HANDS compared to relevant ‘competitors’**

In Table 3 below we compare the major features of the HANDS system to two of the above-reviewed solutions. We have chosen SymTrend and Azahar as relevant

systems to be compared to HANDS as they have at least four general features that make them generally comparable. The two systems are:

- professional-based comprehensive interactive software solutions;
- seemingly on roughly the same level of complexity as HANDS;
- involving the development of a novel system of such complexity;
- partly consisting of mobile components.

The comparison below is not aimed at revealing which application is better or best. Such an evaluation would be very hard to make, as each system involves unique functionalities. Rather, we intend to show that *HANDS is unique* even beyond its unique functionalities as HANDS has important general features, which are not present in its relevant ‘competitors’.

	<b>HANDS</b>	<b>Sym-Trend</b>	<b>Aza-har<sup>3</sup></b>	<b>Co-mai<sup>4</sup></b>	<b>Hand- ifon<sup>5</sup></b>	<b>Micro Roll- talk<sup>6</sup></b>
Structure and content is based on evidence-based intervention principles	YES	YES	YES	NO	NO	NO
Mobile component can be brought into focus situations of intervention	YES	YES	YES	YES	YES	?
Content is highly individualised	YES	YES	YES	YES	YES	YES
Content can be modified at any time according to the actual needs of the user	YES	?	?	YES	YES	YES
Content can be modified by the	YES	NO	NO	YES		

<sup>3</sup>

<http://www.proyectoazahar.org/azahar/loggined.do;jsessionid=FFEF95DEA427FE0CDBE552A897E0E732>

<sup>4</sup> <http://www.hmi-basen.dk/r11x.asp?linkinfo=33178>

<sup>5</sup> <http://www.hmi-basen.dk/r11x.asp?linkinfo=24408>

<sup>6</sup> <http://www.abilia.dk/produkter/produkt.aspx?productgroup=260717&product=1970>



professional from distance					?	?
Easy-to-handle both on the mobile and the web-based interface	YES	YES	?	YES	?	?
Offers the possibility to share knowledge across professionals via its web-based component	YES	NO	NO	NO	NO	NO
Multimedia content	YES	YES	YES	YES	YES	YES
Usage logging	YES	YES	?	NO	NO	NO
Proved to be effective via systematic efficiency study	YES	?	NO	NO	NO	NO

**Table.** Comparing key psycho-educational aspects of HANDS to relevant competitors.

## **Refinement of the HANDS Toolbox exploitation potential**

This section “Refinement of the HANDS Toolbox exploitation potential” should be considered an extension of the Deliverable 8.1 “Socio-economical business model”. Because of this relation it is evidently a good start to summarise the most important findings of D8.1.

The Deliverable consists of 3 sections, dealing with three different segments of the exploitation of the HANDS Toolbox.

1. The market
2. From project to company
3. Plan

### **Ad 1. The market**

The PEST analysis consisted of a number of observations and their analysis. Most remarkable were the statistics of the growing number of individuals with an autism diagnosis. The growth is alarmingly high. The economical consequence for the welfare state budget is significant and forces the municipalities, national governments and The European Commission into attempting a minimization of the number of individuals supported by the welfare state alone via e.g. some kind of transitional allowance.

Another remarkable finding is the necessary rejection of the classical producer-consumer business model due to the fact that each pupil requires a significant customization, which makes the consumers the actual producers of content that could be valuable for other consumers.

### **Ad 2. From project to company**

The D8.1 report considers - via a SWOT analysis - a variety of strategies for transforming HANDS from a project into a company. Central in the strategies is the dilemma between having an agile and decentralized organization in which all decision makers are close to market or having a centralized and strong management that can handle changes in market conditions rapidly.

The viewpoint in D8.1 is that the dilemma exists regardless of which kind of organization model may be chosen, but the D8.1 argues in favour of the first alternative due to the variety of conditions on the national market place and the strength of the different HANDS partners.

On the other hand different mechanisms for improving performance (marketing, product development etc) at the different markets are needed.

The deliverable emphasises a significant “ownership” of the culture of the “HANDS” idea. “The current HANDS network is more than just a business-based network. The participants have reached a high degree of mutual trust and social interactions, friendship and the willingness to help young people with autism.”(p20). It is a vital part of the heritage, which is highly valuable when creating organisations across cultural and national borders.

Furthermore, a discussion on where the revenue of the HANDS Open company is given in the deliverable in question, but no definite conclusion is given, though.

### **Ad 3 Plan**

The first challenge in the actual business plan is to transfer the IPR of the Consortium HANDS to the business “HANDS Open”. All partners in HANDS have agreed to transfer the IPR right of HANDS to the HANDS Open organization. The organisation of HANDS Open has been described in D8.5.

### **Specification of the roles and the interdependencies between the different HANDS stakeholders**

The D8.1 is quite vague on the issue of roles and interdependencies between the different stakeholders of HANDS Open - for a number of good reasons, the main reason being that at present it is transitioning from the current organisation. Second it seems evident that selling this kind of software does not take place in classical producer-consumer business models.

In this section we will describe the interdependencies of the different stakeholders by explaining the business model of HANDS Open; second we will explain the formal organizational structure of HANDS Open; and thirdly we present the first timeline for HANDS Open including financial concerns. But first a number of prerequisites have to be emphasised

- The PEST analysis documents are needed for customizable mobile cognitive support products
- The market is immature
- Commitment, engagement and ethos is highly important in the market in question
- The mobile technology development is moving fast
- The market in one country is different to the market in another
- HANDS is a heterogeneous network with advantages and disadvantages; so is HANDS Open

The first main conclusion is that the management of HANDS Open should be highly dynamically. A scenario-orientated management is required. A tentative list of scenarios is available in Appendix A “Scenarios for HANDS Open”.

### **Business model of HANDS Open**

A business model canvas of HANDS is concerned with the value proposition of an organization. When having identified that for HANDS Open, the rest of the business model is elaborated.

The value proposition is (prioritized):

1. Education in the use of mobile cognitive support tools.
2. Consultancy in using mobile cognitive support tools.
3. Access to Software.

The other important finding in D8.1 is the fact that the software requires a remarkable amount of customization. You may say that each segment of the customers have a population of 1 or emphasize the HANDS slogan “One for each”. When studying contemporary business models<sup>7</sup> the most relevant business model in such case is the Sell-Sumers business model in which Consumers can be Sellers and Sellers can be Consumers. The HANDS architecture enables the teachers to download and adapt social stories, prompts or visual skins to their computer and they may upload the results to the HANDS website again for the sake of the customized solution and for the reuse of experiences.

How the revenue of the producers should be shared, is obviously a good discussion for the HANDS Open board.

### **Regarding the customer relation and segmentation.**

The ability to customize the software will obviously attract users and some of them will use the HANDS products intensively. The HANDS Open organisation finds these users very attractive as they make it more attractive to be a customer of HANDS. Other potential customers will rather be consumers of HANDS products.

Added to this “Segmentation by involvement” there is a segmentation between the professional and family segments. The latter has a very simple decision-making process, but little professional knowledge and the professionals have properties. The families are interesting because they may influence school decisions. The schools are

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<sup>7</sup> Alex Osterwalder: Business model Generation. Available at [http://www.slideshare.net/oukearts/10-new-business-models-for-this-decade?src=related\\_normal&rel=802441](http://www.slideshare.net/oukearts/10-new-business-models-for-this-decade?src=related_normal&rel=802441)

interesting because their budgets for supplementary education are larger and they are more stable customers.

Regarding the need for development of new software it is not a focus area of the HANDS Open organization. First of all the customer is in focus.

The full Business Model is available in Appendix B “The HANDS Open Sell-sumers Business Plan”. In Appendix C, Osterwalder’s original business model of sell-sumers can be found.

The responsibility of the Board of HANDS Open will be:

- To manage the HANDS Open collaboration in a scenario driven manner.
- The overall ICT development strategy
- To confirm and support large funding applications.
- To consider new collaboration partners.
- To decide on common experiments
- To describe the overall purpose and quality of HANDS Open educations
- To confirm educations
- To manage ICT services (server, e-store, web service)
- To facilitate new initiatives

Legally speaking the HANDS Open organization is a “Collaboration Agreement”. Partners should be responsible for taking initiatives with respect to their capacity and their knowledge about national market conditions, rather than letting the HANDS Open Board take on such responsibility. In that sense, the responsibility for a strong HANDS Open collaboration is in the hands of the members’ own initiative.

Some activities has a revenue and the HANDS Open Board decides which percentage of the revenue each HANDS Open member owns, but minor activities are mandatory to all participants:

- Developing local HANDS templates
- Maintaining locally hosted websites

This way, HANDS Open is in line with the recommendations in D8.1.

A potential split of revenue between partners has to balance the local as well as global needs for HANDS. A potentially global HANDS Open organization should obviously focus on further development of the HANDS Open software..

The certified HANDS Open education is one cross-disciplinary activity expected to take place within the organization. Others could be:

- Research – experiments that require participants from several countries and several schools.
- Research – large international and interdisciplinary projects, e.g. funded by the European Commission, inspired by the work done at Aalborg University (AAU)<sup>8</sup> and Massachusetts Institute of Technology (MIT)<sup>9</sup>.
- School driven collaboration, e.g. oriented towards the use of sensor technology.
- Exchange of teachers and/or pupils between the schools.

### **HANDS - positioned on the market**

One of the key findings of the D8.1 was the positive analysis that the market for mobile cognitive support tools is expanding. Furthermore, the ability to master the mobile cognitively is not necessarily present from the start, but it is a skill that has to be and can be taught. In the HANDS Open education, this is the primary revenue stream of HANDS according to the business model for yet another reason: the budgets of the main customer segments - the schools – for software are rather minimal, while budgets for supplementary education are larger.

The functional comparison between the HANDS Open product and the alternatives have already taken place in section 2.3, “HANDS in the ‘market’ of assistive ICT tools for ASD”. In an immature market where customers have very little knowledge about alternatives other characteristics of products and companies become important.

Thus it is important to stress the Unique Selling Proposition of HANDS Open that were captured in D8.1, page 32<sup>10</sup>

1. **Cognitive support tools are collaborative tools:** HANDS can help increasing the teamwork and interaction between teachers, relatives and the toolset user.

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<sup>8</sup> [Vbn.aau.dk/en/projects/humansensing\(f89a6e2f-3e08-46c1-992b-29f385c62ab9\).html](http://Vbn.aau.dk/en/projects/humansensing(f89a6e2f-3e08-46c1-992b-29f385c62ab9).html)

<sup>9</sup> [www.media.mit.edu/affect/pdfs/09.Picard-PhilTranRoyalSocB.pdf](http://www.media.mit.edu/affect/pdfs/09.Picard-PhilTranRoyalSocB.pdf)

<sup>10</sup> [http://hands-project.eu/uploads/docs/HANDS\\_D8.1\\_WIDK\\_R\\_PU\\_2010-5-30.pdf](http://hands-project.eu/uploads/docs/HANDS_D8.1_WIDK_R_PU_2010-5-30.pdf)

2. **Evaluation of efficiency is important for caretakers:** Data collection allows for measuring actual usage and hence the value gained by the end users of the tool set
3. **Core principles of autism pedagogic are core HANDS principles:** The adaptation to each user due to the “One for each” principle gives a possibility for greater value of the tool for each end user.
4. **Flexibility is important in a rapid changing technological environment:** The open platform structure makes it very easy to build new functionality into the toolset in the future.
5. **Research based software:** The research conducted in persuasive interfaces, e-learning and cognitive psychology gives a foundation for the sound use and possible gains when using HANDS.

In addition HANDS Open offers an education that enables the caretakers to master all aspects of integrating online activities with offline pedagogical activities and makes the caretakers part of a professional community.

A detailed comparison between HANDS and alternatives is given in section 2.3, “HANDS in the ‘market’ of assistive ICT tools for ASD”.

## Appendix A. Scenarios for HANDS Open

Scenario	Action	Possible change in HANDS
New EC funding is applied successfully with new partners.	Funding was applied.	A strategic focus gets more attention in the HANDS Open Board. The new partners have to be absorbed in HANDS Open. In terms of collaboration and social interaction. Dependencies may change the organization focus.
Research in e.g. sensors prove interesting for HANDS partners	A. Research experiments take place. B. Education of HANDS Open partners takes place. C. Technology is offered to users.	New opportunities for the HANDS collaboration as well as new research opportunities.
Independent researchers or companies offer their insight or technology to the HANDS Open Board	The offer is given to the users.	A new stream of revenue and requirements to change the organisation
Funding in one country enables the development of new software	Negotiation on who should manage the design and development process	Disagreement among HANDS partners
The HANDS Open organization decides to create a cheap and almost royalty free alternative to Boardmaker	HANDS Open ensures that the alternative gives no legal problems and hires a graphical designer.	More customers and a new stream of revenue.
Google decides to support HANDS with development resources	Specification of the requirements. HANDS Open is being involved in Googles CSR activities.	Better opportunities for ensuring long lasting solutions, improved credibility of HANDS Open. Dependencies may change the organization focus.



## Appendix B – The HANDS Open Sellsumers Business Plan

**The Business Model Canvas**

Designed for: \_\_\_\_\_

Designed by: \_\_\_\_\_

One: \_\_\_\_\_

Iteration: \_\_\_\_\_

<p><b>Key Partners</b></p> <p>Who are our Key Partners? Which Key Partners are we looking to attract? Which Key Partners do we need to succeed?</p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>- HANDS Open members</li> <li>- Software vendor</li> <li>- e-store solution provider</li> </ul>	<p><b>Key Activities</b></p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>Develop SW- templates</li> <li>Develop generic formats and fileformat converters</li> <li>Develop HANDS education</li> </ul>	<p><b>Value Propositions</b></p> <p>What value do we deliver to the customer? Which of our customer's problems are we helping to solve? Which of our customer's needs are we satisfying? Which customer needs are we satisfying?</p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>1. Teach use of cognitive support tools</li> <li>2. Give consultancy</li> <li>3. Software</li> </ul>	<p><b>Customer Relationships</b></p> <p>What type of relationship do we want to build with our customers? How do we want to build that relationship? How are our Channels integrated? Which channels are most important?</p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>HANDS Open</li> <li>Lovers</li> <li>Pragmatists</li> <li>Surfers</li> </ul>	<p><b>Channels</b></p> <p>Through which Channels do our Customer Segments want to be reached? How are our Channels integrated? Which channels are most important?</p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>1. HANDS Open site</li> <li>2. Conference</li> </ul>	<p><b>Customer Segments</b></p> <p>For whom are we creating value? Who are our most important customers?</p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>Relation segmentation</li> <li>1. Producers</li> <li>2. See and consume</li> <li>3. Consumers</li> <li>4. Surfers</li> <li>Demographic segmentation</li> <li>1. Professional</li> <li>2. Caretakers</li> <li>2. ICT- Counsellors</li> <li>2. Doctors</li> </ul>
<p><b>Key Resources</b></p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>- HANDS Network</li> <li>- Monitor for need and market</li> <li>- Governing body aiming at changing HANDS to a actor on the market</li> </ul>		<p><b>Revenue Streams</b></p> <p>For what value are our customers really willing to pay? For what do they currently pay? How much does each Revenue Stream contribute to overall revenue?</p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>1. HANDS certified education</li> <li>2. Access to the software</li> </ul>			
<p><b>Cost Structure</b></p> <p>What are the most important costs inherent in our Business model? Which Key Resources are most expensive? Which Key Activities are most expensive? Which Key Partners help to reduce costs? Which Key Partners help to increase costs?</p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>Develop SW- templates</li> <li>Develop generic formats and fileformat converters</li> <li>Develop HANDS education</li> </ul>		<p><b>Revenue Streams</b></p> <p>For what value are our customers really willing to pay? For what do they currently pay? How much does each Revenue Stream contribute to overall revenue?</p> <p>Handwritten:</p> <ul style="list-style-type: none"> <li>1. HANDS certified education</li> <li>2. Access to the software</li> </ul>			

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This Business model is strongly inspired by a businessmodel developed by Alex Osterwalder. Described briefly at p43-50

[http://www.slideshare.net/oukearts/10-new-business-models-for-this-decade?src=related\\_normal&rel=802441](http://www.slideshare.net/oukearts/10-new-business-models-for-this-decade?src=related_normal&rel=802441)

## Community-Funded Business Model



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